T L Audio

User Manual

8:2/F VALVE MIXER

Tony Larking Professional Sales Limited,

Letchworth, England.

Tel: 01462 490600. International +44 1462 490600.

Fax: 01462 490700. International +44 1462 490700

INTRODUCTION

The T L Audio 8:2/F Valve Mixer combines classic valve techniques with low noise solid state circuitry to produce a unit offering high specification signal paths with the unique valve sound quality. 8 input channels are provided, all with mic and line inputs, switchable 48V phantom power, four band valve EQ, 2 Aux sends, Pan and 100mm Fader. Mixing is via balanced busses to valve mix amplifiers. The stereo output is also controlled by 100mm faders, and monitored by an LED bargraph.

Each channel features a Direct Output, switchable to pre or post EQ and Fader, and configurable for +4dBu or -10dBu nominal level. Two stereo effects returns complete the audio connections.

The number of channels may be extended by the link facility, which enables any number of mixers to be daisy-chained together. Comprehensive monitoring is provided on dedicated outputs, with automatic PFL switching, stereo return and headphone output. Typical applications include direct to stereo recording, use as 8 channel outboard EQ during mixdown, and as a complete studio, stage or PA mixer. The mixer is 10U high, and may be mounted in a 19" rack. A separate, fully regulated DC power supply and cable is included with the mixer.

The block diagram of one of the channels is shown in fig.1. A solid state, electronically balanced input amplifier is used, to achieve state of the art performance with very low noise, low distortion and wide bandwidth. The mic input is via an XLR socket and is suitable for low impedance (150-600 ohm) microphones, with a gain control range of +10 to +60dB. A front panel switch individually selects 48V phantom power. The line input has an effective overall gain range of -20 to +30dB, allowing the valve stages to be fully driven from line level signals in the range -20 to +20dBu.

An insertion point is provided, pre-EQ, providing a means of connecting external equipment (Compressor, for example) into the channel. A rear panel accessable switch selects the Direct Output signal as Pre-EQ, Pre-Fade (post EQ), or Post Fade.

The EQ section uses two twin triode valves per channel, arranged as a voltage amplifier followed by three active EQ stages. The first EQ stage provides shelving LF and HF filters, followed by individual stages for the low-mid and high-mid peaking filters. Increasing the gain at the input stage allows the unique overdriven valve sound to be gradually introduced. The EQ stages may be bypassed for easy A-B comparison. A peak LED adjacent to the fader begins to glow at approximately +4dBu pre fade level, increaing to maximum brightness at +16dBu (i.e. with 6dB headroom remaining).

Mixing to the stereo buss is via a pan control and rotary fader. PFL and channel ON switches are also provided. Two Aux sends are also available, Aux 1switchable pre or post fade, and Aux 2 permanently post fade.

The block diagram of the output and monitoring section is shown in fig.2. After the buss mix amplifiers, the link inputs are also added, allowing expansion to any number

of channels. The stereo outputs are controlled by long throw faders, and interfaced via electronically balanced, earth free solid state output drivers.

The monitoring outputs normally follow the stereo output, but may be switched to the return inputs, to check recording onto tape, for example. Any PFL signal automatically overrides the monitor output. The monitor level and relative PFL level are individually controlled.

A dual, 6 segment LED bargraph normally indicates the main stereo output level, but may also be switched to indicate the monitor levels. The meters are factory set for 0dB indication = +4dBu, but may be recalibrated using a preset accessable from the front panel.

The Aux outputs are controlled by master level controls, and two stereo effects returns provide line level inputs, with gain and balance controls.

Please read this manual fully before installing or operating the mixer.

PRECAUTIONS

As with all electrical equipment, care must be taken to ensure reliable, safe operation of your mixer. The following points should always be observed:

- All mains wiring should be installed and checked by a qualified electrician,

- Ensure the correct operating voltage is selected on the power supply before connecting to the mains supply,

- Connect the power supply to the mixer before switching on,

- Never operate the mixer or power supply with any cover removed,

- Do not expose to rain or moisture, as this may present an electric shock hazard,

- Replace the fuses with the correct type and rating only,

- Refer any service requirement to qualified personnel.

Warning: This equipment must be earthed.

Caution: Ensure adequate ventilation of the power supply and mixer.

INSTALLATION

AC Mains Supply.

The mixer includes a separate T L Audio VR200 power supply, which provides fully regulated DC outputs for the valve HT and heaters, phantom power and solid state circuitry. It is essential that the mixer is only powered from a VR200 supply.

The mixer may be mounted in a standard 19" rack, occupying 10U of space. Adequate ventilation must be provided, with a minimum 1U of free space or vent panel immediately above and below the mixer. Alternatively, the mixer may be table-top mounted, in which case it must be placed on a firm, flat surface which will not obstruct the air flow through the ventilation slots. The rack mounting brackets may be removed if required. In both rack and table top applications, care must be taken to provide a solid support for the mixer and the cables which will be connected to it.

The power supply is fitted with an internationally approved 3 pin IEC connector. A mating socket with power cord is provided with the unit, wired as follows:

Brown: Live.

Blue: Neutral.

Green/Yellow: Earth (Ground).

All mains wiring should be performed by a qualified electrician with all power switched off, and the earth connection must be used.

The power supply generates a certain amount of heat during use, which must be allowed to dissipate from the ventilation slots and heatsink. Never cover the power supply or locate it near a source of heat, for example a radiator or power amplifier.

The power supply should be connected to the mixer with the armoured multi core cable supplied, before connecting the supply to the mains. The connectors should be inserted and secured into place by tightening the locking rings. The cable is specially selected for the high voltage and current requirements. Do not substitute any other cable or attempt to extend the cable supplied.

Before connecting the power supply to the mains, check that the voltage selector switch on the front panel is correctly set. The unit may be set for 115V (accepting voltages in the range 110V to 120V, 60Hz AC), or to 230V (for voltages in the range 220V to 240V, 50Hz AC). The fuse required is 20mm anti-surge, 2AT for 230V rated voltage or 3.15AT for 115V rated voltage.

Warning: attempted operation on the wrong voltage setting, or with an incorrect fuse, will invalidate the warranty.

Audio Connections.

Mic Inputs.

Each channel has a female, 3 pin XLR connector for mic connection. It is compatible with either balanced or unbalanced signals, when the mating connector is appropriately wired:

Balanced inputs:

- Pin 1 = Ground (screen).

- Pin 2 = Signal Phase (“+” or “hot”).

- Pin 3 = Signal Non-Phase (“-” or “cold”).

Unbalanced inputs:

- Pin 1 = Ground (screen)

- Pin 2 = Signal Phase (“+” or “hot”).

- Pin 3 = Signal Ground

When using unbalanced signals, the signal ground may be obtained by linking pins 1 and 3 in the mating XLR connector. Good quality screened cable should be used, particularly for microphone or low level sources, to prevent hum or noise pickup.

Line Input.

A 3 pin, 0.25” jack plug is required, which is also compatible with balanced or unbalanced sources, when wired as follows:

Balanced inputs:

- Tip = Signal Phase (“+” or “hot”),

- Ring = Signal Non-Phase (“-” or “cold”),

- Screen = Ground.

Unbalanced inputs:

- Tip = Signal Phase (“+” or “hot”),

- Ring = Ground,

- Screen = Ground.

Insertion Points.

The insertion points are also interfaced via a 3 pin, 0.25” switched jack socket on the rear of the unit. The pin connections are:

- Sleeve = Ground,

- Tip = Send,

- Ring = Return.

The insertion point is unbalanced. If used as an additional send only (e.g. as a send to a tape machine or monitor mixing desk), the Tip and Ring should be wired together, to preserve the signal path through the insertion point.

Direct Output.

The Direct Output connector is a 3 pin, 0.25” jack socket on the rear of the unit. The output automatically adjusts for balanced or unbalanced connection, and may be internally set for +4dBu (professional) or -10dBu (semi-professional) nominal level. The outputs are factory set for +4dBu, but may be changed by inserting the jumper links supplied.

To convert a Direct Output to -10dBu, first switch off the power supply and disconnect from the mains. The input channel should be withdrawn from the frame, by unlocking the XLR and removing the jack nuts on the rear of the module, and then removing the two screws that retain the module front panel to the frame. The jumper link is located near the Direct Output socket, and is labelled “J1”. After fitting the link, carefully replace the module into the frame, insert the front panel retaining screws, refit the jack nuts and finally lock the XLR.

The mating connector should be wired as follows:

Balanced outputs:

- Tip = Signal Phase (“+” or “hot”),

- Ring = Signal Non-Phase (“-” or “cold”),

- Screen = Ground.

Unbalanced outputs:

- Tip = Signal Phase (“+” or “hot”),

- Ring = Ground,

- Screen = Ground.

Main Stereo Output.

The main outputs are via balanced, 3 pin male XLR connectors. The mating connectors should be wired as follows:

- Pin 1 = Ground (screen),

- Pin 2 = Signal Phase (“+” or “hot”),

- Pin 3 = Signal Non-Phase (“-” or “cold”).

If an unbalanced output is required, pins 1 and 3 should both be connected to ground.

Monitor Outputs.

The monitor outputs are via balanced, 3 pin jack connectors. The mating connectors should be wired as follows:

- Sleeve = Ground (screen),

- Tip = Signal Phase (“+” or “hot”),

- Ring = Signal Non-Phase (“-” or “cold”).

If an unbalanced output is required, the sleeve and ring should both be connected to ground.

Aux Outputs.

The Aux outputs are also via balanced, 3 pin jack connectors. The mating connectors should be wired as follows:

- Sleeve = Ground (screen),

- Tip = Signal Phase (“+” or “hot”),

- Ring = Signal Non-Phase (“-” or “cold”).

If an unbalanced output is required, the sleeve and ring should both be connected to ground.

Stereo 2T Return.

A stereo input is provided to the monitor section, to allow off-tape monitoring, etc.

The inputs are via balanced, 3 pin jack connectors. The mating connectors should be wired as follows:

- Sleeve = Ground (screen),

- Tip = Signal Phase (“+” or “hot”),

- Ring = Signal Non-Phase (“-” or “cold”).

If an unbalanced signal is used, the sleeve and ring should both be connected to ground.

Effects Returns.

Two stereo inputs are provided, for effects returns or other line level sources. The connectors are 3 pin jack sockets, and the mating connectors should be wired as follows:

- Sleeve = Ground (screen),

- Tip = Signal Phase (“+” or “hot”),

- Ring = Signal Non-Phase (“-” or “cold”).

If unbalanced signals are used, the sleeve and ring should both be connected to ground.

Link Inputs and Outputs.

The link facility allows two or more mixers to be “daisy-chained” together, to increase the number of input channels. The stereo outputs, aux mixes and PFL busses are all connected when mixers are linked, with the master controls on the last (“master”) mixer controlling the outputs (see fig. 3.). The output faders and aux masters on the other (“slave”) mixers do not effect the output level from the master, but continue to control their own outputs, which may be used as sub-group outputs.

The link connectors are 15 pin “D” type connectors, with locking posts. The cable used to link mixers together should connect pins 2 to 14 straight through. All of the audio connections on the link connectors are balanced, and the PFL control signal is optically isolated, but pin 1 is an optional ground connection, which may be connected to an overall cable screen.

Headphone Outputs.

The front panel jack socket is suitable for driving headphones of 32 ohms or higher impedance. A standard 0.25” jack plug should be used.

OPERATION.

Channel.

The front panel controls for a channel are identified in fig. 4.

Input Stage.

Ensure that the correct input connector, mic or line, is being used and that the front panel switch is set to the appropriate position. Note that both mic and line inputs may be connected at the same time, but only one is selected.

+48V phantom power is available at the mic socket, controlled by a switch and signalled by a red LED.

CAUTION: Operation of the phantom power switch, or plugging a microphone in with phantom power applied, may cause a click or thump in your loudspeakers. To prevent this happening, ensure that the channel level control and stereo faders are set to minimum before operating the switch or plugging in a microphone. Switching between mic and line at very high input gain settings may also cause an audible thump if the level control is not turned down.

The gain control should be set to obtain the best signal to noise ratio, whilst preserving adequate headroom. Note that there is 50dB variation from fully anticlockwise to clockwise of the gain control, so any changes should be gradual to avoid sudden overload or severe distortion. The line input accepts a wide variety of signals down to a nominal level of -10dB, where the 30dB gain available ensures that the valve stages can be fully driven when required. However, this large amount of gain should be used sparingly on higher level inputs, to avoid an increase in the noise floor and introduction of distortion.

The phase reverse switch operates on both mic and line inputs, before the insertion point.

The high pass filter switch selects low frequency roll-off, at 12dB per octave (2nd order). The filter is optimised to reduce lf microphone noise, with a -3dB point at 90Hz.

Equalisation.

Before switching the EQ into circuit, it is advisable to set the cut/boost controls to their centre, or flat, position. The EQ is brought into circuit with the “EQ” push switch, signalled by a green LED.

Each channel has four bands of equalisation: shelving low frequency (LF), peaking low-mid (LM), peaking high-mid (HM) and shelving high frequency (HF). Each band has a continuously variable cut and boost control, plus a frequency selection switch.

The Q of the mid band filters is approximately 0.5, to cut or boost a moderately broad bandwidth over a +/-12dB range. The shelving filters also provide +/-12dB of cut and boost, over the full range of frequencies below the LF corner frequency and above the HF corner frequency.

Frequency selection for the LF and HF bands is by push switch, with a four position rotary switch selecting the centre frequency of the LM and HM peaking bands. The frequencies have been chosen to enable comprehensive equalisation of any audio signal, with the unique character of valve circuitry.

Aux Sends.

The channel is equipped with two aux sends.

Aux 1 is switchable pre or post fade from the front panel, whist Aux 2 is permanently connected post fade.

PFL Switch.

When PFL, or pre-fade listen, is accessed, a red LED illuminates on the channel (or channels) selected, and also on the master section of the mixer. PFL allows the signal present on the channel to be monitored before the level control is opened and the signal connected to the main output.

ON Switch

The channel may be muted or switched on without affecting the level set on the rotary fader (level control). Green LEDs indicates which channels are currently on.

Pan Control.

The pan control positions the image within the stereo field, from fully left in the anti-clockwise position, through centre at the detented position to fully right in the clockwise position. The gain law is -3dB at the centre.

Level Control.

A 100mm fader is located at the bottom of the channel. The fader provides +10dB of gain at the top.

Peak LED.

The red peak LED is located near the fader. It monitors the pre-fade level, to indicate any potential overload problems due to excessive input gain or boost in the EQ section.

The LED is intensity modulated, begining to glow as the signal exceeds normal line up level of +4dBu, reaching maximum intensity at +16dBu, i.e. with 6dB of headroom remaining..

Insertion Point.

The channel insertion point is configured pre EQ, where it may be used to insert a compressor or other signal processor into the channel path.

Direct Output.

The channel direct out may be used to feed a multitrack tape machine or DAT whilst simultaneously obtaining a live or monitor stereo mix. It also allows the mixer to be operated as 8 independent channels, for example as outboard EQ inserted into a larger console (line input to direct out on the mixer).

The Direct Output pick-off point may be selected to one of 3 positions, using the slide switch on the rear panel. The positions are:

- Pre-EQ, i.e. immediately after the input amplifier and insertion point,

- Pre-Fade, i.e. after the insertion point and EQ, but before the fader,

- Post-Fade, i.e. after the insertion point, EQ and fader.

Stereo Mix.

The controls for the mixer master section are shown in fig. 5.

Two 100mm long throw faders allow accurate control of the stereo mix output levels. The mix includes the link inputs, which are provided to connect more than one mixer together (see above).

Aux Masters.

Each Aux send features a rotary master level control.

Effects Returns.

The two stereo effects returns are each equipped with a rotary fader and balance control. They are added directly into the stereo mix.

PFL buttons allow the returns to be checked by the monitor outputs, meters or headphones.

Monitor Outputs.

The mixer provides a stereo monitor output, for connection to a power amplifier and monitor loudspeakers, plus a headphone output.

The monitor signal normally follows the main stereo output, but will automatically switch over to the PFL buss whenever any PFL button is pressed, this condition being indicated by a red LED. The PFL Balance control allows adjustment of the PFL signal level relative to the main stereo monitor level, as the PFL signal could be considerably louder than the stereo output, depending on the mix.

When recording onto tape, for example, it is sometimes useful to be able to monitor the output from the tape machine, in place of the mixer stereo output, as confirmation that the signal is actually being recorded. This is achieved by selecting the “Monitor Return” button near the monitor level control. This facility may also be used for playback after recording.

Metering.

Two 6 segment LED bargraphs on the mixer normally monitor the main stereo output, but may be switched to follow the monitor signal, in which case they will display any PFL signal that is selected, and also follow the monitor returns as above.

The meters are calibrated to indicate 0dB at a signal level of +4dBu. The reference level may be changed by the “Adjust” trimmer, using a small screwdriver through the front panel.

SPECIFICATIONS

Mic Input: Electronically balanced, input impedance greater than 2Kohm, to suit 150-600 ohm microphones.
48V phantom power available.
Gain range +10 to +60dB.
Noise (EIN): -127Bu at maximum gain with a 150 ohm termination, measured 22Hz-22KHz unweighted.
Maximum input level +10dBu.
3 pin female XLR connector.

Line Input: Electronically balanced, unbalanced compatible, with input impedance greater than 5Kohm.
Gain range -20dB to +30dB, suitable for nominal input levels from -20dBu to +20dBu.
Maximum input level +30dBu.
3 pin 0.25" jack connector.

Phase : Phase reverse switch operates on mic and line inputs.

High Pass Filter:

Operates on mic and line inputs.
2nd order (-12dB per octave), -3dB at 90Hz.

Insertion points:

Tip: Send, source impedance 50 ohms.
Ring: Return, input impedance 10Kohms, unbalanced.

Direct Outputs:

Balanced, unbalanced compatible, 3 pin 0.25" jack connector.
Internal jumper to select +4dBu or -10dBu nominal level.
Switchable Pre-EQ, Pre-Fade or Post-Fade.

Frequency Response:

20Hz to 20KHz, +/-1dB, with EQ by-passed or flat.

Equalisation:

4 bands per channel, comprising:

LF +/- 12dB shelving, 2 switched frequencies at 80Hz and 120Hz.

LM +/- 12dB bandpass, 4 switched centre frequencies at 250Hz, 500Hz, 1KHz and 2K2Hz. Q approximately 0.5.

HM +/- 12dB bandpass, 4 switched centre frequencies at 1K5Hz, 2K2Hz, 3K6Hz and 5KHz. Q approximately 0.5.

HF +/- 12dB shelving, 2 switched frequencies at 8KHz and 12KHz.

EQ on switch, with green LED.

Main Stereo Outputs:

100mm long throw faders.
Electronically balanced outputs, unbalanced compatible.
Output impedance less than 10 ohms, XLR connector.
Maximum level +26dBu into 10Kohms, +22dBu into 600 ohms (balanced).

Noise: Noise floor -90dBu with no input routed,
-85dBu one input at maximum level, line input at 0dB gain,
-78dBu all inputs routed.
All measured 22Hz to 22KHz with terminated inputs.

Dynamic Range:

100dB, all channels routed from line inputs at 0dB gain.

Distortion:

THD+N: 0.05% at 1KHz,
0.1%, 20Hz-20KHz.

IMD: 0.1%.

(All specified for line input to stereo output at 0dBu and 0dB gain).

Effects Returns:

Balanced stereo inputs via TRS jack connectors.
+22dBu maximum input level.
Input impedance 10Kohms.

Power Supply:

Rear panel selectable for 220-240V 50Hz or 110-120V 60Hz operation.
Rear panel fuse 20mm, 2AT (230V nominal), 3.15AT (115V nominal).
Power consumption 180VA typical.
Detachable 3 pin IEC connector, mating connector and cable supplied.
Front panel On/Off switch.
Armoured multicore output cable, 3m (10 feet) long.
Detachable, locking connectors.

Dimensions (Mixer):

19” rack mounting, 10U high.
483mm wide x 444mm high x 150mm deep,
(19” x 17.5” x 6”), excluding connectors.

Dimensions (VR200 Power Supply):

19” rack mounting, 2U high.
483mm wide x 88mm high x 200mm deep,
(19” x 3.5” x 8”), excluding connectors

In line with a policy of continuous development, the above specifications are subject to change without notice.

SERVICE

Should the mixer or power supply require service, it must be taken or posted to an authorised dealer. Please retain the original packing for possible future use, and ensure the unit is suitably protected during transit. The manufacturer cannot accept responsibility for damage caused during transportation.

The mixer is supported by a limited warranty for a period of one year from the date of purchase. During this period, any faults due to defective materials or workmanship will be repaired free of charge. The warranty excludes damage caused by deliberate or accidental misuse, operation on the incorrect mains voltage, or without the correct type and value of fuse fitted. It is the user's responsibility to ensure fitness for purpose in any particular application. The warranty is limited to the original purchase price of the equipment, and specifically excludes any consequential damage or loss.

Please record the following details:

Serial Number.....

Date purchased.....

Dealer.....